

## COMMENTARY TO HABILITATION THESIS<sup>1</sup>

### Characteristics of the Investigated Matter

The habilitation thesis presents a comprehensive and interdisciplinary investigation of the management of pressure ulcers (PUs), with a special focus on surgical approaches, nutritional and biochemical background, oxidative stress, and the use of artificial intelligence in risk prediction. The work is composed of ten original peer-reviewed scientific articles, each addressing a specific aspect of PU therapy and prevention.

The main objectives of the thesis were to:

- Optimize the surgical management of complex pressure ulcers using flap and skin graft techniques.
- Investigate the role of nutritional and biochemical parameters in wound healing outcomes.
- Analyze oxidative stress as a key factor influencing chronic wound behavior and healing potential.
- Employ experimental models to test nutritional supplementation effects on skin regeneration.
- Utilize artificial intelligence (AI) methods to enhance risk stratification and recurrence prediction in PU patients.

### Employed Methodologies

The research integrated clinical retrospective studies, prospective biochemical monitoring in patients, experimental work on animal models, and advanced statistical and computational approaches. A combination of laboratory biomarkers (e.g., albumin, prealbumin, CRP, 8-OHdG), histological evaluation, and machine learning techniques was applied across different settings and patient groups.

### Obtained Results

The thesis demonstrated that:

- Flap reconstruction remains essential in advanced PU surgery but requires precise timing, often guided by nutritional and inflammatory markers.
- The interplay between nutrition and oxidative stress biomarkers appears to be a relevant factor in the regulation of wound healing processes.
- Supplementation with polyunsaturated fatty acids enhances healing processes in vivo.
- Artificial intelligence tools applied to clinical data can accurately predict risk of PU and support clinical decision-making.

### Applicant's Contribution

The author is the first or corresponding author of nine included publications. Her contributions span the entire research process—from conceptualization and study design, through data collection and experimental work, to statistical analysis, interpretation, and manuscript writing. The applicant coordinated interdisciplinary collaboration between clinical, laboratory, and academic institutions and supervised junior researchers involved in the projects.

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<sup>1</sup> The commentary must correspond to standard expectations in the field and must include a brief characteristic of the investigated matter, objectives of the work, employed methodologies, obtained results and, in case of co-authored works, a passage characterising the applicant's contribution in terms of both quality and content.

**[1] HOKYNKOVA, A. \*(corresponding author) \*, P. SIN, F. CERNOCH, M. NOVAKOVA and P. BABULA.** Employment of Flap Surgery in Pressure Ulcers Surgical Treatment. *Ceska A Slovenska Neurologie A Neurochirurgie* [online]. 2017, **80**(1), S41-S44. ISSN 1802-4041. Available at: doi:10.14735/amcsnn2017S41

**Document Type: Article; IF = 0,508; median IF SURGERY – 1,811; Quartile by IF SURGERY Q4; Quartile by AIS NEUROSCIENCES Q4**

Experimental work (%)	Supervision (%)	Manuscript (%)	Research direction (%)
70	50	70	60

**[2] HOKYNKOVA, A., P. SIN, T. ADLEROVA and F. CERNOCH.** Skin grafting in surgical treatment of pressure ulcers. *Ceska A Slovenska Neurologie A Neurochirurgie* [online]. 2022, **85**(1), S12-S14. ISSN 1802-4041. Available at: doi:10.48095/cccsnn2022S12

**Document Type: Article; IF = 0,500; median IF SURGERY – 2,100; Quartile by IF SURGERY Q4; Quartile by AIS SURGERY Q4**

Experimental work (%)	Supervision (%)	Manuscript (%)	Research direction (%)
60	70	70	60

**[3] SIN, P., J. HOLOUBEK, A. HOKYNKOVA \*(corresponding author)\* and B. LIPOVY.** Multidisciplinary approach in surgical pressure ulcer therapy after spinal cord injury. *Ceska A Slovenska Neurologie A Neurochirurgie* [online]. 2019, **82**(1), S52-S55. ISSN 1802-4041. Available at: doi:10.14735/amcsnn2019S52

**Document Type: Article; IF = 0,377; median IF SURGERY – 1,901; Quartile by IF SURGERY Q4; Quartile by AIS SURGERY Q4**

Experimental work (%)	Supervision (%)	Manuscript (%)	Research direction (%)
25	25	25	25

**[4] HOKYNKOVA, A. \*(corresponding author) \*, Z. WILHELM, M. NOVAKOVA, P. BABULA, T. STRACINA, H. PAULOVA, M. HLAVACOVA and M. SEDLACKOVA.** Wound healing effects after application of polyunsaturated fatty acids in rat. *Ceska A Slovenska Neurologie A Neurochirurgie* [online]. 2018, **81**(1), S29-S31. ISSN 1802-4041. Available at: doi:10.14735/amcsnn2018S29

**Document Type: Article; IF = 0,355; median IF SURGERY – 1,883; Quartile by IF SURGERY Q4; Quartile by AIS SURGERY Q4**

Experimental work (%)	Supervision (%)	Manuscript (%)	Research direction (%)
35	30	30	30

**[5]** **HOKYNKOVA, Alica**, Marie NOVAKOVA, Petr BABULA, Miroslava SEDLACKOVA, Hana PAULOVA, Miroslava HLAVACOVA, Daniela CHARWATOVA and Tibor STRACINA. Fatty Acid Supplementation Affects Skin Wound Healing in a Rat Model. *Nutrients* [online]. 2022, **14**(11, Article 2245). ISSN 2072-6643. Available at: doi:10.3390/nu14112245

**Document Type: Article; IF = 5,900; median IF NUTRITION & DIETETICS – 3,600; Quartile by IF NUTRITION & DIETETICS Q1; Quartile by AIS NUTRITION & DIETETICS Q2**

Experimental work (%)	Supervision (%)	Manuscript (%)	Research direction (%)
35	30	30	30

**[6]** **HOKYNKOVA, A.**, P. BABULA, A. POKORNA, M. NOVAKOVA, L. NARTOVA and P. SIN. Oxidative stress in wound healing - current knowledge. *Ceska A Slovenska Neurologie A Neurochirurgie* [online]. 2019, **82**(1), S37-S39. ISSN 1802-4041. Available at: doi:10.14735/amcsnn2019S37

**Document Type: Article; IF = 0,377; median IF SURGERY – 1,901; Quartile by IF SURGERY Q4; Quartile by AIS SURGERY Q4**

Experimental work (%)	Supervision (%)	Manuscript (%)	Research direction (%)
0	10	30	25

**[7]** SIN, P., **A. HOKYNKOVA \*(corresponding author) \***, M. NOVAKOVA, H. PAULOVA, P. BABULA, A. POKORNA, L. NARTOVA, P. COUFAL and M. HENDRYCH. Can different type of pressure ulcers debridement affect oxidative stress parameters?. *Ceska A Slovenska Neurologie A Neurochirurgie* [online]. 2022, **85**(1), S34-S37. ISSN 1802-4041. Available at: doi:10.48095/cccsnn2022S34

**Document Type: Article; IF = 0,500; median IF SURGERY – 2,100; Quartile by IF SURGERY Q4; Quartile by AIS SURGERY Q4**

Experimental work (%)	Supervision (%)	Manuscript (%)	Research direction (%)
30	40	40	50

**[8]** SAMADIAN, Amir, Monika KRATOCHVILOVA, **Alica HOKYNKOVA \*(corresponding author) \***, Petr SIN, Marie NOVAKOVA, Petr STEPKA, Andrea POKORNA and Petr BABULA. Changes in Gene Expression in Pressure Ulcers Debrided by Different Approaches - a Pilot Study. *Physiological Research* [online]. 2023, **72**(5), S535-S542. ISSN 1802-9973. Available at: doi:10.33549/physiolres.935222

**Document Type: Article; IF = 1,900; median IF PHYSIOLOGY - 2,400; Quartile by IF PHYSIOLOGY Q3; Quartile by AIS PHYSIOLOGY Q4**

Experimental work (%)	Supervision (%)	Manuscript (%)	Research direction (%)
30	25	10	50

**[91]** KRIZANOVA, Olga, Adela PENESOVA, Jozef SOKOL, **Alica HOKYNKOVA**, Amir SAMADIAN and Petr BABULA. Signaling pathways in cutaneous wound healing. *Frontiers In Physiology* [online]. 2022, **13**(1030851, Article 1030851). ISSN 1664-042X. Available at: doi:10.3389/fphys.2022.1030851

**Document Type: Review; IF = 4,000; median IF PHYSIOLOGY – 2,800; Quartile by IF PHYSIOLOGY Q2; Quartile by AIS PHYSIOLOGY Q2**

Experimental work (%)	Supervision (%)	Manuscript (%)	Research direction (%)
0	0	25	10

**[101]** SIN, Petr, **Alica HOKYNKOVA** *\*(corresponding author)* \*, Novakova MARIE, Pokorna ANDREA, Rostislav KRC and Jan PODROUZEK. Machine Learning-Based Pressure Ulcer Prediction in Modular Critical Care Data. *Diagnostics* [online]. 2022, **12**(4, Article 850). ISSN 2075-4418. Available at: doi:10.3390/diagnostics12040850

**Document Type: Article; IF = 3,600; median IF MEDICINE, GENERAL & INTERNAL – 2,700; Quartile by IF MEDICINE, GENERAL & INTERNAL Q2; Quartile by AIS MEDICINE, GENERAL & INTERNAL Q2**

Experimental work (%)	Supervision (%)	Manuscript (%)	Research direction (%)
70	30	30	50